

### **AMENDMENTS TO THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously presented) A method for making a modified epoxy, comprising the steps of:
  - a) mixing solvents and clay particles into a clay solution;
  - b) submitting the clay solution to a high pressure, high flow velocity and shearing flow in a micrometer-range circuit, to breaking impacts of the particles in a region of obstacles, and to a reduces pressure, yielding a dispersed clay particles solution; and
  - c) mixing the dispersed clay particles solution with at least a pristine epoxy;whereby particles in the modified epoxy are finely and homogeneously distributed.
2. (Previously presented) The method according to claim 1, wherein said step a) comprises incorporating clay particles of a dimension in a micrometer range in a liquid solution.
3. (Currently amended) The method according to claim 1 ~~to any one of claims 1 and 2~~, wherein said step a) comprises incorporating a first part of the pristine epoxy and said step c) comprises mixing the dispersed clay particles solution with a remaining part of the pristine epoxy.
4. (Currently amended) The method according to claim 1 ~~to any one of claims 1 to 3~~, wherein said step a) comprises mixing with at least one of mechanical and ultrasonic mixing.

5. (Currently amended) The method according to claim 1 ~~any one of claims 1 to 4~~, wherein said step b) comprises submitting the clay solution to a pressure of about 20,000 psi in tubes of a diameter of about 0.1 mm.

6. (Previously presented) The method according to claim 1, wherein said step b) comprises exfoliating the clay particles in the solution.

7. (Currently amended) The method according to claim 1 ~~any one of claims 1 to 6~~, wherein said step c) comprises mixing the dispersed clay particle solution with the pristine epoxy and curing agents to yield a solid epoxy material.

8. (Currently amended) The method according to claim 1 ~~any one of claims 1 to 7~~, whereby the modified epoxy comprises agglomerates of less than about 1  $\mu\text{m}$  and agglomerates of a maximum diameter comprised between about 1  $\mu\text{m}$  and 2  $\mu\text{m}$ .

9. (Currently amended) The method according to claim 1 ~~any one of claims 1 to 8~~, whereby the modified epoxy has enhanced viscoelastic properties, improved fracture toughness, and critical strain energy release rate compared to the pristine epoxy.

10. (Previously presented) The method according to claim 9, whereby the modified epoxy has increase in  $K_{1C}$  and  $G_{1C}$  of up to 2 and 8 times respectively with respect to the pristine epoxy, at about 1 wt % of clay loading.

11. (Currently amended) The method according to claim 1 ~~any one of claims 1 to 9~~, whereby the modified epoxy has enhanced barrier properties, including water absorption resistance, adhesion strength and flammability resistance, with respect to the pristine epoxy.

12. (Currently amended) The method according to claim 1 ~~any one of claims 1 to 10~~, wherein a mixture of clay and epoxy obtained has a stability over an extended period of time.

13. (Previously presented) The method according to claim 1, wherein the pristine epoxy is a rubber-modified epoxy resin.

14. (Previously presented) An apparatus for making modified epoxy from a pristine epoxy, comprising:

- a first container for preparing a solution of clay particles;
- a device for dispersing the solution of clay particles; and
- a second container for mixing the dispersed solution of clay particles with the

pristine epoxy;

wherein said device for dispersing the solution of clay particles comprises a first section submitting the solution of clay particles to a high pressure and a high velocity; a second section of obstacle; and a pressure-collapse chamber; an output solution from said device having a fine and homogeneous distribution of clay particles of nano-dimensions.

15. (Previously presented) The apparatus according to claim 14, wherein the solution of clay particles comprises part of the pristine epoxy.

16. (Previously presented) The apparatus according to claim 14, wherein the pristine epoxy is incorporated in the solution of clay particles in one of said first container and said second container.

17. (Currently amended) The apparatus according to claim 14 ~~any one of claims 14 to 16~~, wherein said section of obstacle submits the solution of clay particles to breaking impacts.

18. (Currently amended) The apparatus according to claim 14 ~~any one of claims 14 to 17~~, wherein the pristine epoxy is a rubber-modified epoxy.

19. (Currently amended) The apparatus according to claim 14 ~~any one of claims 14 to 18~~, wherein the solution of clay particles comprises additives.

20. (Previously presented) A modified epoxy produced from a pristine epoxy, the modified epoxy having at least higher barrier properties and thermal resistance than the pristine epoxy, by mixing solvents and clay particles of a dimension in a micrometer range into a clay solution; submitting the clay solution to high pressure gradient between input and output to generate a high flow velocity, shearing flow and breaking impacts of the particles in a region of obstacles, then to a lower pressure, yielding a dispersed clay particles solution; and mixing the dispersed clay particles solution with at least part of the pristine epoxy; particles of nano-dimensions in the modified epoxy being finely and homogeneously distributed.

21. (Previously presented) The modified epoxy according to claim 20, comprising finely dispersed clay agglomerates of less than about 1  $\mu\text{m}$  and agglomerates of a maximum diameter between about 1  $\mu\text{m}$  and 2  $\mu\text{m}$ .

22. (Previously presented) The modified epoxy according to claim 21, wherein a content of clay agglomerates at about 1 wt % of clay loading yield an increase in a fracture toughness, with an increase in  $K_{IC}$  and  $G_{IC}$  of up to 2 and 8 times with respect to the pristine epoxy respectively.

23. (Currently amended) The modified epoxy according to claim 21 ~~any one of claims 21 and 22~~, wherein said pristine epoxy is a rubber-modified epoxy.

24. (Currently amended) The modified epoxy according to claim 21 ~~any one of claims 21 to 23~~, further comprising additives.

25. (Currently amended) A use of the modified epoxy according to claim 21 ~~any one of claims 21 to 24~~, for making components for parts used in a field selected in the group consisting of aircraft industry, automobile industry, sport equipment manufacturing, adhesive and sealant manufacturing, wood products, coatings and for manufacturing of components for pipes, boats and reservoirs.